



SUBSTITUTE SPECIFICATION

METHOD FOR PRODUCING NANOSILICATE PLATES

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BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to the use of polymeric polyamines as exfoliating agents for producing random nanosilicate plates from layered silicate clays, and particularly to a method for producing nanometer scale silicate plates by directly exfoliating inorganic layered silicate clays with multiple functional quaternary salts, which are prepared specifically from amine-terminating Mannich oligomers (AMO) or amine-terminating epoxy oligomers (AEO). The invention also relates to a method involving ionic exchange between layered silicates and organic quaternary amines, aqueous sodium hydroxide extraction process, recycling the exfoliating agents and finally the isolation of random silicate plates.

2. Description of the Related Art

Currently, inorganic/organic polymer composite materials in a nanometer scale regime (approximately 1~100 nanometer scale) are one of the most important materials, and thus have been widely investigated and developed. Such nanocomposite materials have two different phases including inorganic and organic components, wherein at least one phase is dispersed under a nanoscale regime in a homogeneous manner. Accordingly, the compatibility in the nanoscale mixing between two distinct phases, for example, inorganic clay and organic polymer, is the essential factor for the nanocomposite's physical and mechanical performance. In general, the clay/polymer hybrid materials can be classified into two categories of composites, the intercalated and the exfoliated, on the basis of the clay dispersion in polymer matrix. In an intercalated structure, the silicate plates still maintain their layered structure but with the addition of organic intercalants anchored in the gallery. In the exfoliated form, each individual silicate plate is randomly dispersed in the polymer matrix.